REMARKS

Claims 1, 4, 5, 7, 9, 10, 13, 14, 16 and 18 are pending in this application. By this amendment, Applicants amend claims 1, 5, 10 and 14 and cancel claims 2, 3, 6, 8, 11, 12, 15 and 17.

The Drawings were objected to for allegedly failing to show every feature of the invention specified in the claims. Applicants have canceled claims 3 and 12 which recited the features that are not illustrated, particularly, a surface acoustic resonator, a transversely coupled resonator filter and a ladder type filter. Accordingly, Applicants respectfully request reconsideration and withdrawal of this objection.

Claims 1, 2, 4-7, 10, 11 and 13-16 were rejected under 35 U.S.C. § 102(b) as being anticipated by Ago et al. (U.S. 5,684,437). And claims 3, 8, 9, 12, 17 and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ago et al. in view of Kadota et al. (U.S. 6,163,099). Applicants respectfully traverse these rejections.

Claim 1 has been amended to recite:

> "A surface acoustic wave device comprising:
> **a longitudinally coupled resonator filter** including:
> a piezoelectric substrate having a pair of substrate edges and an upper surface therebetween and including a main region and a bottom surface, the piezoelectric substrate having **at least one step formed therein and extending from one of the pair of substrate edges to an inner edge of the step located spaced from the one of the pair of substrate edges and arranged to contact the main region and to extend from the upper surface toward the bottom surface of the piezoelectric substrate inside the one of the pair of substrate edges;**
> **at least two interdigital transducers** provided on the main region of the piezoelectric substrate such that shear horizontal type surface acoustic waves excited by the interdigital transducer and having a wavelength of λ are reflected by the at least one inner edge;
> wherein **a distance L between the inner edge of the at least one step and the corresponding one of the substrate edges is in the range of about $\lambda/10$ to about 8λ, and a depth of the at least one step is in the range of about 2λ to about 6λ.**" (Emphasis added)

Claim 10 has been amended to recite features that are similar to the features recited in claim 1, including the emphasized features.

The present claimed invention greatly reduces spurious responses, such as ripples, that are caused by bulk wave resonance that occurs in conventional surface acoustic wave devices. The unique combination of the various dimensional ranges in the longitudinally coupled resonator filter recited in the present claimed invention greatly reduces these spurious responses. Particularly, by setting the distance between the substrate edges and reflection edges (defined by the inner edge of the step) in the range of about λ/10 to about 8λ ripples in the pass-band caused by bulk waves are minimized, and excellent resonance characteristics and pass-band characteristics are obtained. Furthermore, by setting the height of the reflection edge (defined by the depth of the step) within the range of about 2λ to about 6λ, ripples in the pass-band are minimized, and excellent resonance characteristics and pass-band characteristics are obtained.

The Examiner alleged that Ago teaches "a surface acoustic wave device comprising a piezoelectric substrate 5 having a pair of edges, an interdigital transducer 4 provided on a main region wherein a distance L between at least one inner edge and corresponding one of the substrate edges is equal to about 8λ or less (column 5, lines 47-49). Also inner edge has a height H in the range of about 2λ to about 6λ." Applicants respectfully disagree with the Examiner's interpretation of Ago.

In contrast, Ago teaches a surface acoustic wave resonator including **only** a single interdigital transducer, and clearly fails to teach or suggest "a longitudinally coupled resonator filter including . . . at least two interdigital transducers" as recited in claims 1 and 10 of the present application.

Further, Ago teaches grooves 22b and 22c that are provided in the substrate, as opposed to "at least one step" as recited in claims 1 and 10 of the present application. In particular, the grooves 22b and 22c of Ago do **NOT** extend from one of the substrate edges, but rather are clearly located **spaced from** the substrate edges, as seen in Figure 5 and 6. Accordingly, Ago clearly fails to teach or suggest "at least one step formed therein and extending from one of the pair of substrate edges to an inner edge of the step located spaced from the one of the pair of substrate edges and arranged to

contact the main region and to extend from the upper surface toward the bottom surface of the piezoelectric substrate inside one of the substrate edges" as recited in claims 1 and 10 of the present application.

Additionally, the Examiner alleges that "If someone were to measure the distance, as disclosed by applicant's claim 1, from 'one inner edge and the corresponding one of the substrate edges', would see that the range is between λ/10 and 8λ (see figure 4)" of Ago. However, Ago teaches NO specific range of values for the distance between an inner edge and the corresponding one of the substrate edges, and certainly fails to teach or suggest the specific range of "about λ/10 to about 8λ/10" as recited in claims 1 and 10 of the present application.

In fact, the object of Ago is merely to increase the stability of chips where the number of electrode fingers is small to thereby make it possible to reliably and easily perform work such as die bonding, see col. 2, lines 31-36. Ago does not even address the problem of spurious responses caused by bulk wave resonance that occurs in conventional surface acoustic wave devices. Thus, Ago certainly fails to teach or suggest the unique combination of various dimensional ranges recited in the present claimed invention which, when provided in a longitudinally coupled resonator filter, minimize ripples in the pass-band to achieve excellent resonance characteristics and pass-band characteristics.

Kadota et al. (U.S. 6,163,099) fails to teach or suggest any steps provided in a piezoelectric substrate of a longitudinally coupled resonator filter, and certainly fails to teach or suggest "a distance L between the inner edge of the at least one step and the corresponding one of the substrate edges is in the range of about λ/10 to about 8λ" and "a depth of the at least one step is in the range of about 2λ to about 6λ" as recited in claims 1 and 10 of the present application.

Furthermore, it is noted that Kadota et al. (U.S. 6,163,099) qualifies as prior art under 35 U.S.C. § 102(e)/103, and Kadota et al. and the present application were, at the time the present invention was made, owned by the same company or subject to an obligation of assignment to the same company. Thus, Applicants submit herewith a

Declaration under 37 C.F.R. § 1.130 which indicates that Kadota et al. (U.S. 6,163,099) and the present application were, at the time the invention was made, owned by the same company or subject to an obligation of assignment to the same company.

Accordingly, Applicants respectfully submit that Kadota et al. is not a proper reference under 35 U.S.C. § 102(e)/103.

Accordingly, Applicants respectfully submit that Ago et al. and Kadota et al., taken individually or in combination, fail to teach or suggest the unique combination and arrangement of elements recited in Claims 1 and 10 of the present application.

In view of the foregoing Amendments and Remarks, Applicants respectfully submit that Claims 1 and 10 are allowable over the prior art for the reasons described above. Claims 4, 5, 7 and 9, and claims 13, 14, 16 and 19 are dependent upon claims 1 and 10, respectively, and are therefore allowable for at least the reasons that claims 1 and 10 are allowable.

In view of the foregoing Remarks, Applicants respectfully submit that this application is in condition for allowance. Favorable consideration and prompt allowance are respectfully solicited.

To the extent necessary, Applicants petition the Commissioner for a One-month extension of time, extending to March 30, 2002, the period for response to the Office Action dated November 30, 2001.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. A surface acoustic wave device comprising:

a longitudinally coupled resonator filter including:

a piezoelectric substrate having a pair of substrate edges and an upper surface therebetween and including a main region and a bottom surface, the piezoelectric substrate having at least one [inner edge] step formed therein and extending from one of the pair of substrate edges to an inner edge of the step located spaced from the one of the pair of substrate edges and arranged to contact the main region and to extend from the upper surface toward the bottom surface of the piezoelectric substrate inside the one of the pair of substrate edges;

[an] at least two interdigital transducers provided on the main region of the piezoelectric substrate such that [a] shear horizontal type surface acoustic waves excited by the interdigital transducer and having a wavelength of λ are reflected by the at least one inner edge;

wherein a distance L between the inner edge of the at least one [inner edge] step and the corresponding one of the substrate edges is in the range of about $\lambda/10$ to about 8λ, and a depth of the at least one step is in the range of about 2λ to about 6λ.

5. A surface acoustic wave device according to claim 1, wherein said at least one step comprises [the upper surface of the piezoelectric substrate has] a pair of [grooves] steps arranged substantially parallel to the substrate edges and extending from the upper surface toward the bottom surface of the piezoelectric substrate.

10. A communication device comprising:

at least one surface acoustic wave device including:

a longitudinally coupled resonator filter comprising:

a piezoelectric substrate having a pair of substrate edges and an upper surface therebetween and including a main region and a bottom surface, the piezoelectric substrate having at least one [inner edge] step formed therein and extending from one of the pair of substrate edges to an inner edge of the step located spaced from the one of the pair of substrate edges and arranged to contact the main region and to extend from the upper surface toward the bottom surface of the piezoelectric substrate inside the one of the pair of substrate edges;

[an] at least two interdigital transducers provided on the main region of the piezoelectric substrate such that [a] shear horizontal type surface acoustic waves excited by the interdigital transducer and having a wavelength of λ are reflected by the at least one inner edge;

wherein a distance L between the inner edge of the at least one [inner edge] step and the corresponding one of the substrate edges is in the range of about $\lambda/10$ to about 8λ, and a depth of the at least one step is in the range of about 2λ to about 6λ.

14. A communication device according to claim 10, wherein said at least one step comprises [the upper surface of the piezoelectric substrate has] a pair of [grooves] steps arranged substantially parallel to the substrate edges and extending from the upper surface toward the bottom surface of the piezoelectric substrate.